Operating Instructions

PTT

Peltier Thermostating Unit

LMTZ 831

Valid from series: 1
YAME0020 Version 01/04/09

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First some safety information

Before you operate the device, thoroughly read through all the instructions and safety information in Section 1. If you have any queries, please feel free to call us.

Follow the instructions about siting, operation, etc., as only then can improper handling of the device be eliminated and the full warranty coverage maintained.

The device is switched off using the toggle switch on the external power supply unit.

The device and its internal parts can be damaged by:

- dropping

- vibration

The device may only be operated by appropriately instructed personnel.

Never operate the device without tempering liquid!

The operating instructions contain additional safety information which is identified with a triangle with an exclamation mark ⚠. Read and follow the instructions. Ignoring the instructions can lead to severe consequences, e.g. personal injury, damage to property or the device itself.

Special symbols:		
	Be careful!	This sign is used when improper handling can lead to property damage and/or personal injury.
	Note:	Here, something in particular needs the reader's attention. In certain circumstances this includes a note about a hazard.
	Reference	Refers to further information in other sections.

Technical modifications reserved.

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1 Safety information

1.1 General safety information

The PTT Peltier Thermostating Unit cools or heats tempering liquids and sample liquids. Hazards arise from this due to high or low temperatures, fire and the general hazards due to the application of electrical energy.

The user is extensively protected by the application of the relevant standards. Further hazard sources can arise from the type of material for which the temperature is to be stabilised, e.g. by exceeding or undercutting certain temperature thresholds or with the fracture of the sample liquid container and reaction with the tempering liquid.

It is not feasible to include all possible situations. They remain essentially subject to the judgement and responsibility of the operator.

The device may only be used as intended, that is as described in these operating instructions. This includes operation by instructed specialist personnel.

The device conforms to the EMC standard DIN EN 61326-1 Class A.

The device is not designed for use under medical conditions according to DIN EN 60601-1 or IEC 601-1.

1.2 Additional safety information

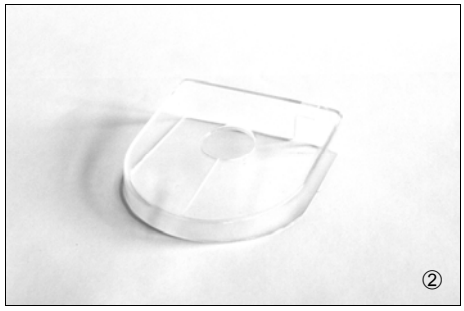
- Only connect the device to a mains socket having a safety earth conductor.
- At higher operating temperatures parts of the beaker receptacle can take on surface temperatures of over 70 °C. Be careful when touching the device. → Danger of burns.
- Withdraw the mains plug of the PTT unit before cleaning, servicing, or moving it.
- Have repairs to the PTT carried out only by specialists.
- Figures for temperature accuracy and display accuracy apply under normal conditions according to DIN 12876.

2 Package contents

After unpacking, first check the unit and accessories for any transport damage. If the device is found to be damaged, the haulage or postal company must be immediately informed so that verification can take place. In this connection please inform the LAUDA Service Centre or an authorised LAUDA representative.

Please check the package contents for completeness:

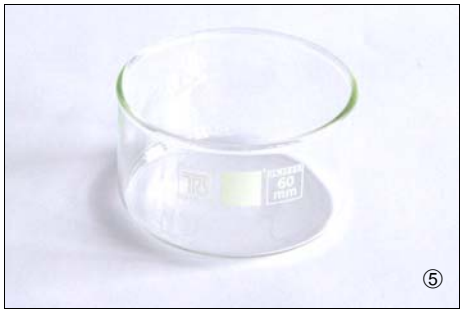
PTT Thermostating Unit



Cover

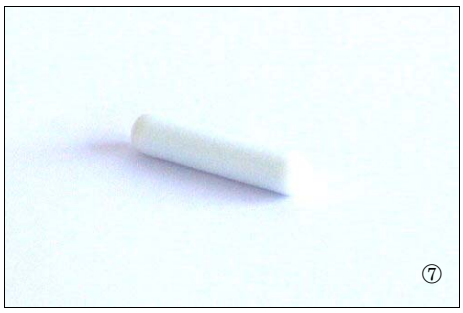
Power supply unit

Temperature sensor

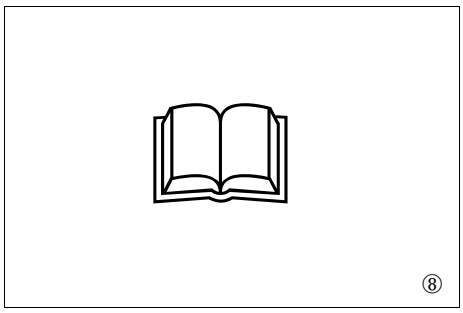


Beaker 60

Filling syringe



Magnetic stirring rod 15 mm D 4.5



(This manual)

3 Device description

3.1 Basic principles

The PTT Thermostating Unit facilitates the exact temperature stabilisation of small amounts of liquid up to 60 ml from 5 °C to 80 °C.

The liquid can be stirred if required using an inserted magnetic stirring rod (included in the supplied items).

For vibration-free measurement applications all electrical components (fans, magnetic stirrer, power electronics for the thermostating unit) can be deactivated in the *standby* mode.

The PTT uses four Peltier elements spread uniformly around the circumference of the beaker. Heat is supplied or extracted depending on the tempering situation. Ambient air enters the device through the intake areas (ribbed regions at the front left and rear right), it circulates around the heat exchanger within the device and leaves the device through the side exit areas.

In order to ensure perfect air circulation neither the ventilation openings nor the exit areas should be restricted or covered.

The PTT is equipped with a protection system which safeguards the power electronics and Peltier elements from thermal overload.

A bimetallic switch fitted internally in the beaker receptacle provides additional protection from the container overheating above 90 °C.

3.2 Temperature display and control

Measurements and setting values as well as operating statuses are displayed on the front of the PTT using a 3-figure 7-segment display 888. The entry of the set value and other settings occurs using the button/rotary function of the control knob.

The Pt100 temperature sensor for the acquisition of the momentary sample temperature is connected via the "Sensor" socket. A high resolving A/D converter processes the measurement. Further measurement processing occurs via a special control algorithm which implements the control of the Peltier electronic tempering system.

To measure the temperature of the samples reliably the Pt100 sensor must be immersed by at least three millimetres in the sample liquid. With thermostating processes extended over a longer period the reduction in level due to evaporation must be taken into account as necessary.

The liquid should be kept in motion by an inserted stirring rod in order to facilitate improved heat transport and to ensure a uniform temperature throughout the whole liquid volume.

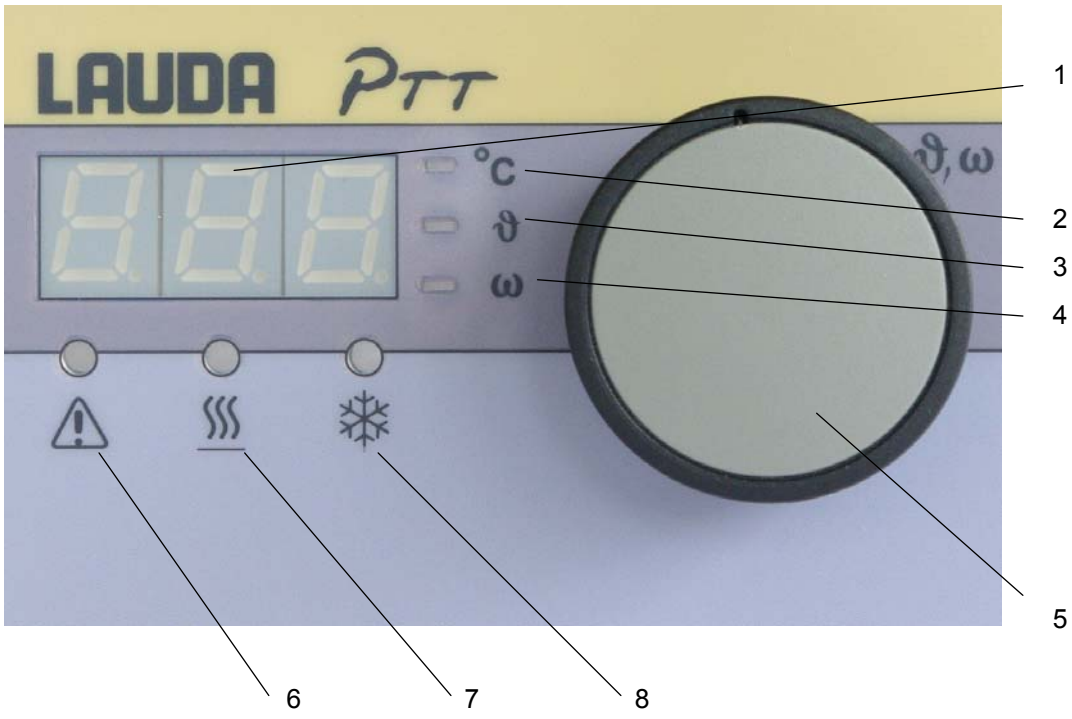
3.3 Operating and functional controls

All operating and functional controls on the PTT are situated at the front.

A 3-figure 7-segment display indicates the actual and set-point temperatures, the stirrer speed and error messages.

Three LEDs positioned close to the display specify the figures shown in the display. Indicators located below the display represent the operating statuses.

The control knob has rotary and button functions, the operation of which is described in Section ⇨ 4.2.



1 Display (actual temperature, set-point temperature, set stirrer speed, error code)

2 Indicator for actual temperature ("°C")

3 Indicator for set-point temperature ("ϑ")

4 Indicator for rotational speed ("ϖ")

5 Control knob: Set-point adjustment by rotation; press to set the magnetic stirrer

6 Indicator for malfunction

7 Indicator for heating phase

8 Indicator for cooling phase

3.4 Interfaces and sockets

The PTT is equipped as standard with the following interfaces and sockets:

- "Power" socket for connection to an external power supply unit

- "Sensor" socket for connection to an external Pt100 measurement probe

☞ "Command" socket is actually not active

- USB socket (at the back and covered, only for servicing)

4 Installation and operation

4.1 Installation

1. Site the Peltier unit on a firm, uncluttered surface. Maintain at least 6 centimetres spacing on all sides (air access).
2. With the switch set to the "0" position, connect the power supply unit to the electrical mains network (100...240 V) and connect the plug securely to the Peltier device ("Power").

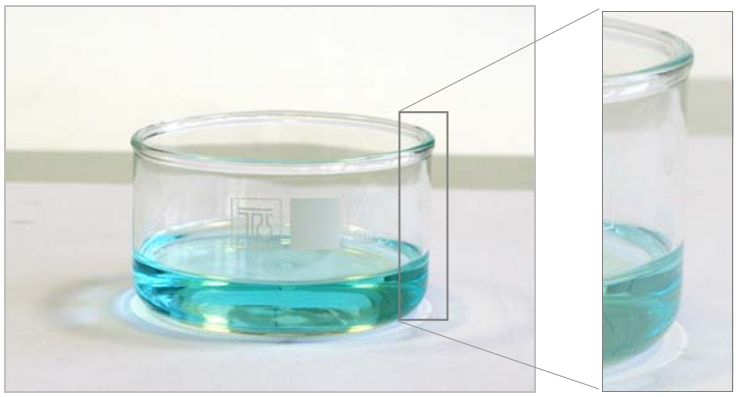
3. Connect the temperature sensor to the Peltier device ("Sensor").
4. Fill the thermostatic block with 6...6.5 ml of tempering liquid using the filling syringe.

The thermostatic block should be sufficiently filled, but not overfilled. Too little tempering liquid reduces the heat transport and can lead to the system switching to EMERGENCY OFF.

The devices are rated for operation with non-flammable and flammable liquids according to DIN EN 61010-2-010. Watch the filling level.

Generally, decalcified water is used as the tempering liquid. Please ensure that the evaporation rate remains low, so that sufficient tempering liquid is always available. Please note that with an unsuitable choice of medium condensate interacts with the sample in your beaker. Please ensure that your tempering liquid does not interact with the thermostatic block (material: anodised aluminium).

5. Fill the beaker with at least 40 ml of sample liquid and put it in place.



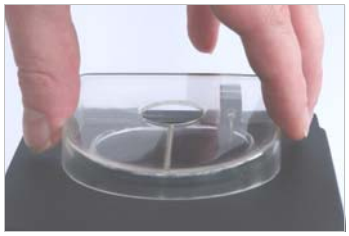
The minimum filling amount is 40 ml. It is only then that the immersion depth required by the temperature sensor is ensured.

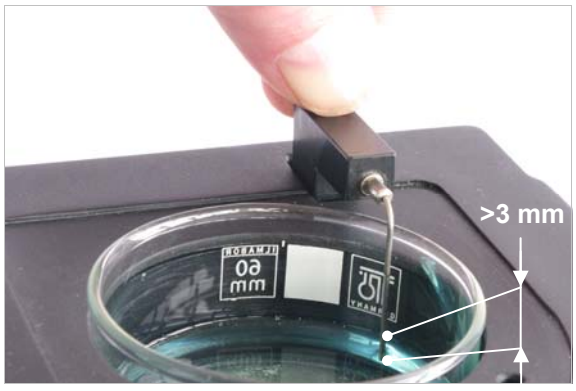
6. Place the filled sample beaker in the thermostatic block.

When the beaker is inserted, the tempering liquid rises up the outer wall of the beaker. The highest possible filling level is desirable for the best possible heat transfer.

⇨ 4.3 Checking the filling level

7. Insert the temperature sensor; if required use the stirring rod and put the cover in place.





The temperature sensor should be immersed in the sample by at least 3 millimetres. When inserting the beaker, the tempering liquid level should ideally rise up to about 8 millimetres above the standing surface of the beaker.

8. The PTT is put into operation by actuating the switch ("On" = **I**). In the default setting the device tempers the liquid to 25°C.

On starting, the device automatically carries out a self-test. All indicators on the front display are activated for 2 seconds for checking purposes. The display indicates the current sample temperature (LED "°C" is lit).

The set-point temperature is set by simply turning the control knob. The LED "**θ**" lights as long as the figure for the set-point temperature is displayed.

Provided the user does not change the settings, the device operates with the standard values T_{SET}= 25 °C and **ω** = 0 (corresponds to deactivated stirrer). When working without a stirring rod, the stirrer should remain deactivated. Stirrer activity is indicated by the flashing of the control knob.

☞ *The device can be switched off at any time by resetting the toggle switch.*

☞ *Three seconds after entering a new set-point temperature, the current sample temperature is automatically displayed.*

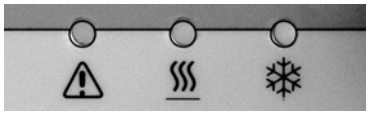
☞ *If an error code is indicated, please refer to the appropriate section* (⇨ 6.1).

9. Setting the speed of the magnetic stirrer occurs by briefly pressing the control knob: As long as the LED "ϖ" (4) is lit, the speed can be adjusted by turning the knob (steps 1...9). Stirrer activity is indicated by the flashing of the control knob.

The magnetic stirrer is switched off by pressing the control knob again (step 0).

Three seconds after entering a new speed, the current sample temperature is automatically displayed again.

Three LEDs indicate the three operating statuses "Malfunction", "Heating" and "Cooling":



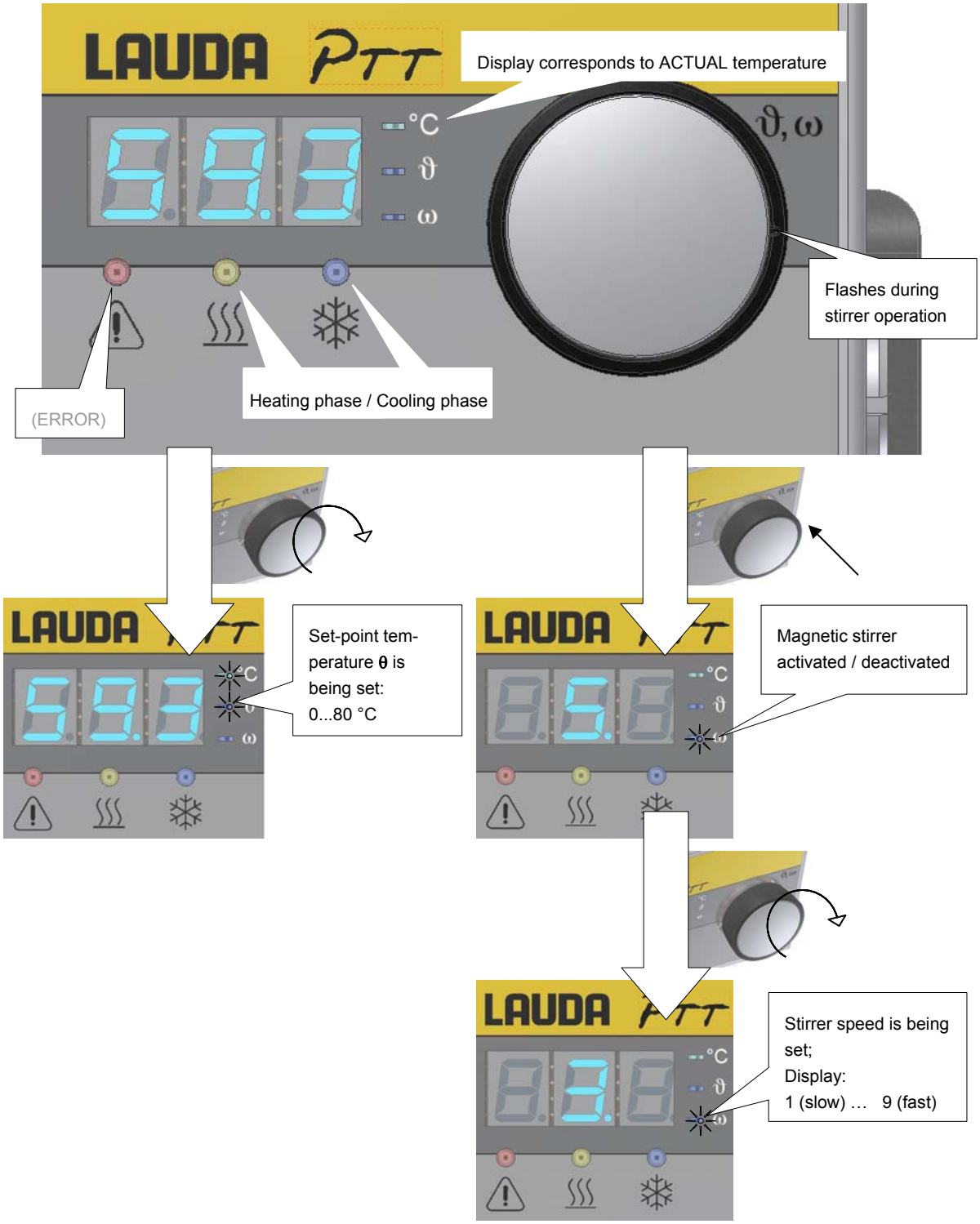
Malfunction Heating Cooling

With "Malfunction" please note the error code indicated in the display, switch off the device at the power supply unit and refer to the error messages. (⇨ 6.1).

4.2 Operation

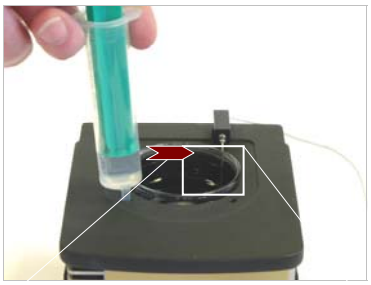
The PTT Peltier Thermostating Unit can be easily operated due to the intuitive one-knob operation and clear visual feedback.

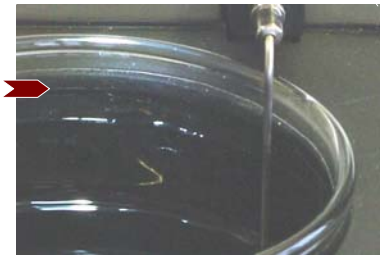
Standard situation (after switch-on and in operation)



New settings are automatically accepted after approx. 3 seconds and the device then resets to the adapted standard operating situation.

4.3 Checking the filling level





The optimum amount of tempering liquid is 6.5 ml. With an insufficient filling level for the tempering liquid it can be topped up even with the beaker in place. To do this the required amount of tempering liquid is introduced through the filling hole using the filling syringe.

It is desirable to have a sufficiently high filling level of tempering liquid for the best possible heat transfer.

With longer tempering processes visually check the filling level.

4.4 Switching off

● The PTT can be switched off at *any time* by actuating the switch ("Off" = **O**).

4.5 *Standby* mode

The PTT can be put into a *standby* mode. To do this the control knob is held pressed for at least 3 seconds.

In this way all electrical components (fans, magnetic stirrer, power electronics for the thermostating unit) are deactivated.

The *standby* function is used for periods in which the beaker is removed from the system (e.g. when changing the sample liquid) or for (measurement) phases which require a vibration-free environment.

The device must be put into the standby mode when the temperature sensor is out of the sample liquid for longer than two minutes in order to prevent overheating of the system and triggering of the EMERGENCY-OFF function.

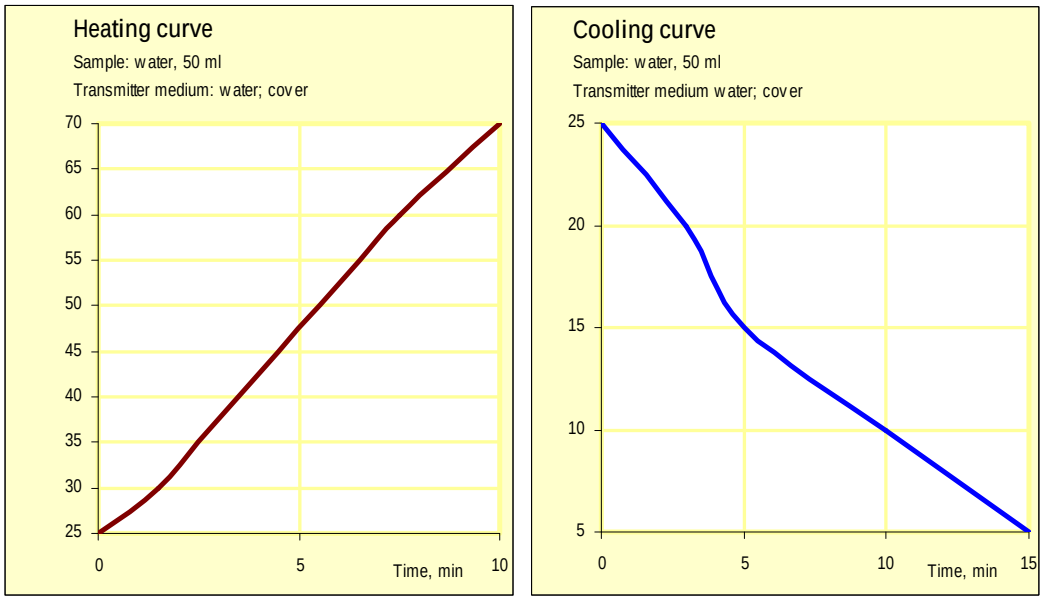
Return to the operating mode occurs by again pressing the control knob for at least three seconds.

5 Technical data

PTT Series A		
Operating temperature	°C	5...80
Ambient temperature	°C	10...40
Relative humidity	%	40…60
Temperature for storage	°C	- 10…50
Setting resolution	°C	0.1
Display resolution	°C	0.1
Temperature accuracy	K	± 0.1
Cooling output @ 25 °C	W	10
Overall size W x D x H	mm	125 x 150 x 100
Stirring steps		0 (deactivated) 1…9
Weight	kg	1.1
Type of protection to DIN EN 60529		IP 21
Power consumption	W	100

Technical modifications reserved.

Heating and cooling curves



Technical modifications reserved.

Heating and cooling curves; bath closed; tempering liquid water; T_{amb}=21 °C; t [min], T [°C].

6 Appendix

6.1 Error messages

The Self-Check Assistant of your PTT Thermostating Unit monitors numerous device parameters and issues error messages, if necessary.

All messages are indicated in the display using error codes which are interpreted according to the error list and can be remedied as required.

Message	Meaning	Remedy
Er.0	Memory error, parameter	*Report to LAUDA Service*
Er.1	Memory error, hardware	*Report to LAUDA Service*
Er.2	Sensor not connected	Connect sensor to PTT unit
Er.3	Internal T-sensor defective	Check immersion depth of external sensor
Er.4	Fault on Command supply	*Report to LAUDA Service*
Er.5	Power stage overload	*Report to LAUDA Service*
Er.6	Driver overheating	*Report to LAUDA Service*
Er.7	Undervoltage for power driver	*Report to LAUDA Service*
Er.8	Difference, T-sensors	*Report to LAUDA Service*
Er.9	Fan problem	*Report to LAUDA Service*

To protect the unit against overheating it is equipped with a bimetallic protection device. This device completely isolates the unit from the power supply when the temperature of the receiving container exceeds 90 °C. In this case please contact the Service Department.

6.2 Ambient conditions

The use of the thermostating unit is only admissible under the conditions stated in DIN EN 61010-2-010:2003 and DIN EN 61010-1:2001.

- The device may be set-up and operated only indoors.
- Place on a sealed, flat, non-slip and non-flammable siting base.
- For proper operation it is essential to conform to the ambient temperature requirement (refer to ⇨ Technical data).
- Relative humidity (refer to ⇨ Technical data).
- Overvoltage Category II and transient overvoltages according to Category II.

6.3 Materials

The bath which comes into contact with the tempering liquid consists of anodised aluminium. A tempering liquid compatible with the material is decalcified water.

The black cover plate is manufactured from tempered moulded material similar to PP/ABS. The material is thermally stable up to 130 °C.

The cover panels fitted to the sides are manufactured from material similar to ABS.

The transparent top cover consists of PX522HT, temperature-resistant up to 110 °C.

Damage to the device due to the use of liquids, which can modify the above mentioned materials, is in no case covered by the warranty from LAUDA Dr. R. Wobser GmbH & Co KG. The resulting damage can on no account be rectified free of charge.

6.4 Cleaning

Cleaning can be carried out with water with a few drops of a surfactant (washing-up liquid) added and with the aid of a damp cloth.

Withdraw the mains plug before cleaning the device. It is essential to avoid the ingress of water into the ventilation slots and the sockets.

Be careful when using the device in the TD 3 Tensiometer: No residues of washing-up liquid should enter the measuring beaker.

6.5 Repair information - service

Withdraw the mains plug before all servicing and repair work.

Have repairs carried out only by specialists.

When sending in a device, please ensure that it is carefully and properly packed. LAUDA cannot be held liable for any damage due to improper packing.

If you want to send in a device for repair, it is essential to first consult the LAUDA Instrument Service SMG or an authorised representative.

When ordering replacement parts, please state the type of device and number on the rating label on the rear panel. This avoids queries and erroneous shipment.

The serial number is composed as follows, e.g. **LMT850-09-0001**

LMT850	=	Article number
09	=	Year of manufacture 2009
0001	=	Incremental numeration.

Your contact for maintenance and expert service support:

LAUDA Instrument Service SMG

Phone:

+49 (0)9343/ 503-148 Mr. Stastny (Techn. Support)

+49 (0)9343/ 503-128 Ms. Brömel (Support)

For queries, ideas and critique:

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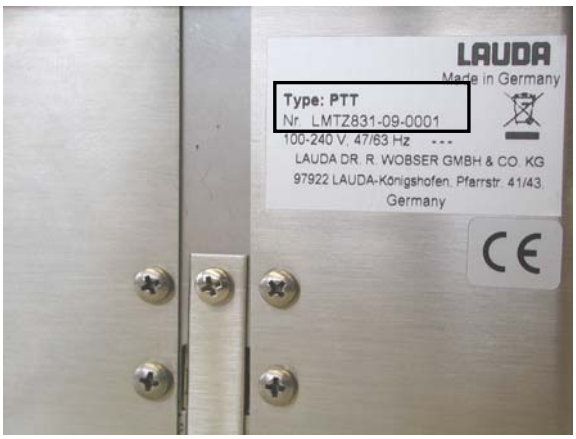
6.6 Accessories, replacement parts

Description	Application / function	LAUDA order no.
PTT cover (transparent plastic cover)	Reduction of temperature changes in the vicinity of the surface and ingress of dust (tensiometry), wind protection, reduction of evaporation.	HGH 188
Temperature sensor	Sensor for determining the actual temperature.	DU 711
Sample beaker	Sample beaker D.60x32 mm, pack of 10	EG 011
Disposable syringe	Filling and topping up tempering liquid.	EGP 012
PTFE stirring rod (diameter 4.5 mm, length 15 mm)	Mixing the sample for optimum heat transfer	EZ 265

To avoid erroneous shipments please quote the device type and number from the rating label. The rating label is located on the back panel of the device.



Rating label with device details *(LMTZ831-nn-nnnn)*

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BESTÄTIGUNG / CONFIRMATION / CONFIRMATION

An / To / A:
LAUDA Dr. R. Wobser • LAUDA Service Center • Fax: +49 (0) 9343 - 503-222

Von / From / De :

Firma / Company / Entreprise: _____

Straße / Street / Rue: _____

Ort / City / Ville: _____

Tel.: _____

Fax: _____

Betreiber / Responsible person / Personne responsable: _____

Hiermit bestätigen wir, daß nachfolgend aufgeführtes LAUDA-Gerät (Daten vom Typenschild):
We herewith confirm that the following LAUDA-equipment (see label):
Par la présente nous confirmons que l'appareil LAUDA (voir plaque signalétique):

Typ / Type / Type :	**Serien-Nr. / Serial no. / No. de série:**

mit folgendem Medium betrieben wurde
was used with the below mentioned media
a été utilisé avec le liquide suivant

_____

_____

_____

_____

Darüber hinaus bestätigen wir, daß das oben aufgeführte Gerät sorgfältig gereinigt wurde, die Anschlüsse verschlossen sind, und sich weder giftige, aggressive, radioaktive noch andere gefährliche Medien in dem Gerät befinden.

Additionally we confirm that the above mentioned equipment has been cleaned, that all connectors are closed and that there are no poisonous, aggressive, radioactive or other dangerous media inside the equipment.

D'autre part, nous confirmons que l'appareil mentionné ci-dessus a été nettoyé correctement, que les tubulures sont fermées et qu'il n'y a aucun produit toxique, agressif, radioactif ou autre produit nocif ou dangeureux dans la cuve.

Stempel **Seal / Cachet.**	**Datum** **Date / Date**	**Betreiber** **Responsible person / Personne responsable**

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